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Turgut Aykin

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EXAMINER

FEENEY, BRETT A

ART UNIT	PAPER NUMBER
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3624

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05/06/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/614,483	Applicant(s) AYKIN, TURGUT	
	Examiner BRETT FEENEY	Art Unit 3624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01/14/2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 20 is/are pending in the application.
- 4a) Of the above claim(s) 8 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 January 2009 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of the Claims

1. The following is in response to Applicant's submission received 01/14/2009.
2. Claims 9 – 19 were previously withdrawn.
3. Claim 8 was missing and was therefore not examined, as it was not filed in the instant application. A telephone interview with Turgut Aykin was conducted on 04/29/2009, noting the missing claim 8, where Dr. Aykin noted that there was a numbering error when drafting the claims and there was no claim 8 submitted in the instant application. The Examiner noted that claim 8 was withdrawn from consideration in the instant office action and that appropriate correction should be provided in response to the office action. Applicant should note the status of claim 8 as withdrawn, cancelled or currently amended as appropriate in response to this office action.
4. Claims 1 – 7 and 20 are currently pending and have been examined. Claim 8 has been withdrawn from consideration.

Requirement for Information under 37 C.F.R. § 1.105

5. Applicant and the assignee of this application are required under 37 CFR 1.105 to provide the following information that the examiner has determined is reasonably necessary to the examination of this application.

6. The information is required to identify patents and publications embodying the disclosed subject matter of the instant invention; specifically the algorithms recited in claims 1 – 7 (Noting, steps i – xii of claim 1).
7. In response to this requirement please provide any known information that describes the steps claimed in the instant claims. Please include any material that describes:
 - How Applicant came in possession of the algorithms disclosed.
 - If Applicant derived the algorithms, what specific algorithms were modified to create the derived algorithms and how do the modified algorithms recited in the claims differ from the modified algorithms (i.e. what are the substantive differences that alter the function, reliability, input(s) required, output(s) generated from the algorithms, etc.).
 - If known to Applicant, what are the specific differences between the algorithms claimed and other prior art algorithms.
 - Any other information that Applicant finds relevant to ascertaining the patentability of instant claims over the prior art.
8. The fee and certification requirements of 37 C.F.R. § 1.97 are waived for those documents submitted in reply to this requirement. This waiver extends only to those documents within the scope of this requirement under 37 C.F.R. § 1.105 that are included in the applicant's first complete communication responding to this

requirement. Any supplemental replies subsequent to the first communication responding to this requirement and any information disclosures beyond the scope of this requirement under 37 C.F.R. § 1.105 are subject to the fee and certification requirements of 37 C.F.R. § 1.97.

9. In responding to those requirements that require copies of documents, where the document is a bound text or a single article over 50 pages, the requirement may be met by providing copies of those pages that provide the particular subject matter indicated in the requirement, or where such subject matter is not indicated, the subject matter found in applicant's disclosure.
10. The applicant is reminded that the reply to this requirement must be made with candor and good faith under 37 CFR 1.56. Where the applicant does not have or cannot readily obtain an item of required information, a statement that the item is unknown or cannot be readily obtained will be accepted as a complete response to the requirement for that item.
11. This requirement is subject to the provisions of 37 C.F.R. §§ 1.134, 1.135 and 1.136 and has a shortened statutory period of 2 months. EXTENSIONS OF THIS TIME PERIOD MAY BE GRANTED UNDER 37 CFR 1.136(a).

Claim Objections

12. Claims 1- 7 and 20 are objected to because of the following informalities: Claims 1 – 7 and 20 recite acronyms that are not first defined. For example, Applicant

recites "the B&C" algorithm", "LP relaxation" and "RA algorithm". Prior to using acronyms, Applicant should recite what the Applicant means by the acronym. For example. Applicant may want to recite the Branch & Cut (B&C) algorithm. Appropriate correction is required.

13. The drawings are objected to because the page numbers and FIG (FIG 4, page 1) overlap and FIG 4, beginning on page 1 is not labeled. Applicant may want to label drawings that do not fit on a single page separately. For example, Applicant may want to label FIG 4 as FIG 4A, 4B and 4C respectively. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and

informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Rejections under § U.S.C. 112

14. Claims 1 – 7 and 20 are rejected as failing to define the invention in the manner required by 35 U.S.C. 112, second paragraph.

15. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

- Claim 1 recites “a MILP model”; “a B&C algorithm” and “a RA algorithm”. However, no models or algorithms are recited in the claims nor are they specially defined in the specification. Therefore, the claim is indefinite on its face. In order to correct this deficiency, Applicant may want to recite the specific algorithms in the claim. Further, where symbols are used in recited algorithms, Applicant should recite the meaning of the symbols. For example, where X_{ki} is recited in an equation; Applicant may recite: wherein X_{ki} is the number of agents assigned.
- Claim 1 recites “by any means”. By any means is indefinite. In the instant examples, Applicant may claim an exemplary means that is supported in the specification. For example, Applicant may recite that the acquiring step is performed by a computer. The Examiner has interpreted that the means for acquiring the requirements and constraints is a computer.
- Claim 1 recites the limitation “a contact type” in steps (a) and (c) the claim. “Contact type” is vague and indefinite. Applicant may want to amend the claim to

recite a specific contact type such as telephone calls, email and the like as recited in the specification. Alternatively, Applicant may want to replace “contact type” with “interaction media”, which is described in the specification. The Examiner has interpreted a contact type to mean a telephone call.

- Claim 1 recites the limitation in step(c) “the constraints”, in step (d) “the LP relaxation” and “the B&C algorithm”. There is insufficient antecedent basis for this limitation in the claim. The claims may be written to recite [] constraints, a LP relation and a B&C algorithm to correct these deficiencies. The Examiner notes that an object should be properly introduced by referring to it with the appropriate pronoun “a” or “an” and when later referred to in the claim or dependent limitations should be referred to using “the” or “said”. The Examiner directs applicant to sections 608.01(i)-(p) of the MPEP for guidance regarding claim construction.
- Claim 1 recites “solving the LP relaxation of the MILP model formulated in the B&C algorithm” in step (d) of the claim. However, no steps are recited nor algorithm provided to show how the LP relaxation is solved. Therefore, this claim is indefinite and appears to be lacking essential steps. In order to correct this deficiency, Applicant may want to recite the steps that are being performed to solve the LP relaxation or recite an algorithm that is used to solve the relaxation.
- Claim 1 recites “if an optimal solution to the MILP model is found” in step (d) of the claim. However, no criteria are provided for how one would determine that an “optimal solution” is found. As noted above, this claim is indefinite and appears to

be lacking essential steps. In order to correct this deficiency, Applicant may want to recite the steps that are being performed to determine that an “optimal solution” has been found or recite an algorithm that is used to find an optimal solution given a plurality of constraints. The Examiner has interpreted an optimal solution to be a possible solution given the constraints.

- Claim 1 recites “the decision variables” in step (i) of the claim. However decision variable lacks antecedent basis in the claim. See above for how to correct this deficiency. The Examiner has interpreted the decision variables to mean the solution of the MILP model.
- Claim 1 recites “Rounding the fractional values of decision variables U, W, V, QX, QU, QW, QV, and G down, and weekly tour variables X” in step (ii) of the claim. However, none of the decision variables X, U, W, V, QX, QU, QW, QV, and G are defined, therefore the claim is indefinite. Where symbols are used in recited algorithms, Applicant should recite the meaning of the symbols. For example, where X_{ki} is recited in an equation; Applicant may recite: wherein X_{ki} is the number of agents assigned. Step (iii) recites Y and Z; step (vi) recites G, and therefore suffers from this same deficiency. The Examiner could not Examine this claim on its merits as the decision variables were not explicitly defined.
- Claim 1 is replete with conditional language “if”; for example, step (ii) recites “if their fractional part is less than or equal...”. Therefore the claim is indefinite. Steps should be positively recited. For example, Applicant may amend the claim to recite “when their fractional part is less than or equal...” to ameliorate this

deficiency. The Examiner has interpreted the aforementioned limitations to mean "when" a condition occurs, rather "if" a condition occurs.

- Claim 1 recites "computing agent shortages and excesses" in step (v) of the claim. However, no algorithm is recited for how the "computing is performed". Therefore, the claim is indefinite and appears to be missing essential steps. Applicant may recite a specific set of steps or an algorithm that is used to compute the shortages and excesses. Step (vi) suffers from this same defect.
- Claim 2 recites "only some integrality constraints", however some is a relative term. Therefore, the claim is indefinite on its face. The Examiner does not know what Applicant intends "some" to encompass. To correct this deficiency Applicant may recite a number of constraints that may be violated or recite steps for how one would determine what constraints may be violated and what constraints may not, etc. The Examiner has interpreted only some to mean at least one.
- Claim 3 recites "the terminal solution" which lacks antecedent basis in the claim. The Examiner can not determine if Applicant intends to refer to "the best integer solution" recited in claim 1 or a new solution. The Examiner has interpreted the claim to mean the best integer solution.
- Claim 5 recites "the best lower bound" which lacks antecedent basis in the claim. Appropriate correction is required as described above. Further, it appears that Applicant intended for the claim to recite best lower bound [solution] in the B&C algorithm. Applicant should amend the claim accordingly. The Examiner has interpreted the claim to mean a best lower bound solution.

- Claim 20 recites "means for acquiring" requirements, parameters, criterion; "means for generating" a model and a tour schedule; "means for solving" a model however, no means are defined in the specification. Therefore the claim is indefinite on its face. The examiner has interpreted the means to refer to a computer program.

Rejections under § U.S.C. 101

16. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

17. Claims 1 – 7 and 20 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

18. Claims 1 – 7 are directed to a method. However, the recited steps of the method are held to be non-statutory subject matter because the recited steps of the method are (1) not tied to another statutory class or (2) not transforming the underlying subject matter to a different state or thing. In order to overcome this rejection Applicant may tie steps recited in the claim to a computer. For example, step (d) of claim 1 may be implemented by a computer such that step (d) would be amended to recite "solving by the computer the LP relaxation...".

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19. Claim 20 is directed to a computer program. However, the recited components appear to lack the necessary physical components (hardware) to constitute a machine or manufacture under § 101. Therefore, these claim limitations can be reasonably interpreted as computer program modules or software *per se*. The claims are directed to functional descriptive material *per se* and hence non-statutory.

Rejections under § U.S.C. 103

20. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

21. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Examiner's Note: The Examiner has pointed out particular references contained in the prior art of record within the body of this action for the convenience of the Applicant. Although the specified citations are representative of the teachings in the

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art and are applied to the specific limitations within the individual claim, other passages and figures may apply. Applicant, in preparing the response, should consider fully the entire reference as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

22. Claims 1 – 7 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dietrich et al., (US 5,216,593), In view of Castonguay et al., (US 6,856,680 B2).

Claim 1

Dietrich shows:

- (c) *formulating the constraints and objective function of a Mixed Integer Programming (MILP) model* (see at least column 4, lines 2-44; Noting techniques for solving “mixed integer programming problems”. Further, see at least FIG 4 and associated text in column 11, lines 9-19; Noting, the formulation of a plurality of constraints.);
- (d) *solving the LP relaxation of the MILP model formulated in the B&C algorithm, and stopping the B&C algorithm if an optimal solution to the MILP model is found* (see at least column 5, lines 23-45; Noting, the linear relaxation of the problem is solved until on violated inequalities are found and the optimal resource allocation is generated.);
- (e) calling the RA algorithm comprising of the following steps if a solution to a node violating only some integrality constraints is found by the B&C algorithm (see at least column 5, lines 23-45; “...generated list of clique and cover induced inequalities is scanned to select a set violated by the solution of the linear relaxation of the DARA problem.”);
- (f) applying the RA algorithm to the solution found for the current node by the B&C algorithm, and passing it to the B&C algorithm if an integer feasible a solution better than the best integer solution known by the RA algorithm is found (Id. Noting, “decisions are used to update the data” and “[t]he solution yields that optimal resource allocation producing the maximum benefit.

Dietrich does not explicitly show staffing level requirement rules recited in the limitations below, however, Castonguay does:

- (a) *acquiring net staffing level requirements for each contact type, and for each period to be scheduled by any means* (see at least columns 1 and 2; lines 63-67 and 1-9, respectively; Noting, Castonguay teaches a contact type (telephone call), staffing plan (net staffing level), and time of day and day of week to be staffed (period to be scheduled).);
- (b) *acquiring tour, shift, days-off, and break scheduling rules, agent skills groups, part time/full time agent work groups, agent availability, and objective criterion to be optimized and its parameters by any means* (see at least column 18, lines 4-25; Noting agent and tour rules are provided in order to generate the optimal schedule.);

It would have been obvious to a person of ordinary skill in the art, at the time of the invention to combine the constraint based resource scheduling methods of Dietrich and Castonguay because efficiently “allocating available resources [] minimize the cost of production and maximize profits...” (Dietrich, column 1, lines 34-47).

Claims 2

Furthermore, Dietrich shows:

- repeating steps for every node the B&C algorithm solves and finds a solution violating only some integrality constraints, until a terminal solution to the MILP model is reached (see at least columns 3 and 4, lines 55-67 and 1-2, respectively; "The most common method for solving the mixed 0-1 program (1.1) above consists of relaxing the integrality requirement of the vector δ , replacing it with the bounding constraint $0 \leq \delta \leq 1$, solving the associated linear program (LP) and then using a branch-and-bound methodology to obtain a solution that satisfies the integrality constraint.");

Claims 3 & 4

Furthermore, Castonguay teaches creating schedules for agents (see at least FIG 8 and associated text in column 13, lines 46-65; Noting that schedules are created for a plurality of agents. While the schedule is displayed in FIG 8 only shows a single day, it may be modified to depict a week, month, etc. Further, see columns 13 and 14, lines 66-67 and 1-33, respectively; Noting that the schedules are detailed with activity codes.).

It would have been obvious to a person of ordinary skill in the art, at the time of the invention to combine the constraint based resource scheduling methods of Dietrich and Castonguay because efficiently "allocating available resources [] minimize the cost of production and maximize profits..." (Dietrich, column 1, lines 34-47).

Claims 5

Dietrich teaches a terminal solution when the produced solution of the algorithm reaches a predefined threshold (see at least column 17, lines 5-20; “If we choose to restrict the algorithm to producing covers with rhs less than or equal to some threshold c, then STEPs 3 and 4 are skipped.”).

Claims 6

Furthermore Dietrich shows:

- *a terminal solution is found when an integer feasible solution is found and a pre-specified period of time is passed* (see at least column 7, lines 5-20; Noting, computational time restrictions for creating models. Further, see at least column 12, lines 29-52; Noting, “feasible integer solutions” are detected in solving the combinatorial problem.).

Claims 7

Furthermore Dietrich shows:

- *a terminal solution is found when an integer feasible solution is found and a pre-specified number of nodes are solved in the B&C algorithm* (Id. Further, see at least column 18, lines 25-33; Noting, Dietrich teaches solving a specified number of nodes to reduce the size of the tree.).

Claim 20 recites limitations addressed in the claims above. Therefore claim 20 is rejected for similar reasons.

Conclusion

The following references were not cited as prior art in the instant office action, however they are considered pertinent to the instant invention:

Sorkin, (US 6622134 B1), discloses a system and method for constructing and solving linear and integer-based programs.

Foseca et al., (US 2004/0054564 A1), discloses a system and method for efficiently allocating resources.

Mangshoel et al., (US 6856680 B2), discloses a system and method for assigning resources in a contact center.

Arguello et al., (US 7249047 B2), discloses a system and method for optimizing employee assignments based on a plurality of business rules.

Any inquiry of a general nature or relating to the status of this application or concerning this communication or earlier communications from the Examiner should be directed to **Brett Feeney** whose telephone number is **571.270.5484**. The Examiner can normally be reached on Monday-Thursday, 7:30am-6:30pm. If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, **BRAD BAYAT** can be reached at **571.272.6704**.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

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<http://portal.uspto.gov/external/portal/pair> . Should you have questions on access to the

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Any response to this action should be mailed to:

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or faxed to **571-273-8300**.

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30 April 2009

/BRETT FEENEY/

Examiner, Art Unit 3624

/Bradley B Bayat/

Supervisory Patent Examiner, Art Unit 3624